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Docket No. 0756-2119

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

#13 Response  
N/E M. Brunson  
8/28/02

In re Patent Application of

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Art Unit: 2814

Hisashi OHTANI et al.

)

Examiner: P. Cao

Serial No. 09/550,598

)

Filed: April 17, 2000

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For: SEMICONDUCTOR DEVICE

)

AND PROCESS FOR

)

PRODUCING THE SAME

)

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Washington, D.C. 20231, on 8/16/02

**RESPONSE**

Honorable Commissioner of Patents

Washington, D.C. 20231

Sir:

The Official Action mailed May 6, 2002 has been received and its contents carefully noted. This response is filed within three months of the mailing date of the Official Action and therefore is believed to be timely without extension of time.

Applicants note with appreciation the consideration of the Information Disclosure Statements filed on April 17, 2000, June 14, 2000, September 7, 2000, October 16, 2000, December 1, 2000 and September 20, 2001. However, Applicants have not received acknowledgement of the Information Disclosure Statement filed on February 2, 2002. Applicants respectfully request that the Examiner provide an initialed copy of PTO-1449 evidencing consideration of these references.

Claims 1-12, 14-15, 18 and 20-29 are pending in the present application, of which claims 1-4, 14-15 and 28-29 are independent. For the reasons set forth in detail below, these claims are believed to be in condition for allowance.

Paragraph 2 of the Official Action rejects claim 9 under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicant regards as the invention. Specifically, the Official Action asserts that zinc oxide, aluminum flakes and nickel flakes are not "organic resin" as recited in claim 1. Applicant respectfully disagrees. Claim 9 depends on claim 5, which

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in turn depends on claim 1. Claim 1 recites an embedded conductive layer comprising an organic resin. Claim 5 further recites that the organic resin contains a conductive material. Claim 9 further recites that the conductive material is selected from the group of zinc oxide, aluminum flakes and nickel flakes. Thus, it is respectfully submitted that the claims do not require or recite that zinc oxide, aluminum flakes or nickel flakes are an organic resin and are thus not unclear or indefinite. Reconsideration is requested.

Paragraph 4 of the Official Action rejects claims 1, 5, 7, 9, 14, 18, 20-26 and 27-29 as obvious based on the combination of U.S. Patent 6,043,149 to Jun and U.S. Patent 5,706,064 to Fukunaga et al.

As stated in MPEP § 2143-2143.01, to establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. Obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either explicitly or implicitly in the references themselves or in the knowledge generally available to one of ordinary skill in the art. "The test for an implicit showing is what the combined teachings, knowledge of one of ordinary skill in the art, and the nature of the problem to be solved as a whole would have suggested to those of ordinary skill in the art." *In re Kotzab*, 217 F.3d 1365, 1370, 55 USPQ2d 1313, 1317 (Fed. Cir. 2000). See also *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988); *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992).

Furthermore, the fact that references can be combined or modified is not sufficient to establish *prima facie* obviousness. See MPEP 2143.01, under the heading *FACT THAT REFERENCES CAN BE COMBINED OR MODIFIED IS NOT SUFFICIENT TO ESTABLISH PRIMA FACIE OBVIOUSNESS*, wherein it is stated that "The mere fact that references can be combined or modified does not render the

resultant combination obvious unless the prior art also suggests the desirability of the combination. *In re Mills*, 916 F.2d 680, 16 USPQ2d 1430 (Fed. Cir. 1990)."

It is respectfully submitted that the Official Action has failed to show sufficient motivation to combine the references to achieve the present invention. As previously noted, the present invention is directed to a method for producing a semiconductor device wherein an insulating layer and an embedded conductive layer both comprise an organic resin. On page 11 of the specification, in lines 19-29 it is stated:

In the etch back process, the etching selectivity of the insulating layer 102 and the embedded conductive layer should be noted. Since an organic resin film is used as the insulating film 102 in Figure 1A, it is etched to the extent similar to the embedded conductive layer 104 in the etch back process, and no step is formed therebetween.

However, in the case where the insulating layer 102 is a silicon oxide film, the etch back process must be terminated at the time when the silicon oxide film is exposed, otherwise only the embedded conductive layer 104 is etched in the opening to form a step at the opening.

Thus, there are significant advantages achieved by the claimed method for producing a semiconductor device.

Turning now to the rejection in paragraph 4 of the Official Action, the Official Action admits that Jun fails to disclose that the embedded conductive layer comprises a same organic resin as the resin of the interlayer insulating film. The Official Action, however, relies on Fukunaga for curing this deficiency of Jun and asserts that it would have been obvious to combine the teachings of Jun and Fukunaga in order to provide a substrate for a display device which can be used in liquid crystal in a high speed response mode and achieves a low price, as taught by Fukunaga in column 1, lines 55-59.

It should first be noted that the method disclosed by Jun is entirely different from that of Fukunaga. That is, as shown in Fig. 16A of Fukunaga, a 5 weight % toluene solution 415 of methylenephénylpolsilane is coated with a film thickness of 2.0 micrometer by spin-coating. As shown in Fig. 16D, a mask 416 by which the signal line is covered and the Cs line 411b and the contact portion 411a are opened is used to perform exposure with use of deep-UV. In this manner, a latent image 417 is formed on polysilane resist above the Cs line 403 and the source electrode 409. Subsequently, as

shown in Fig. 16E, the TFT array substrate is dipped in a black sol-gel solution and thereafter, is rinsed with pure water. Further, the substrate is subjected to pre-baking at 100° C for 10 minutes. After baking, the portions 411a and 411b are black and have a conductivity property (see column 19, lines 54 - column 20, line 37).

It is respectfully submitted that the above described method of Fukunaga is significantly different from that disclosed by Jun, that it would not have been obvious to modify the method of Jun and Fukunaga to achieve the presently claimed method. That is, there has been an insufficient showing that one of skill in the art would have been motivated to modify the method of Fukunaga with that taught by Jun to achieve the present invention. In this regard, the motivation asserted in the Official Action (i.e. in order to provide a substrate for a display device which can be used in liquid crystal in a high speed response mode and achieves a low price, as taught by Fukunaga in column 1, lines 55-59) would not require the combination of Fukunaga and Jun. Based on this motivation, one of skill in the art need look no further than Fukunaga for this teaching and would have found no need to consult Jun or to modify the teachings of Fukunaga. As noted above, the mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination. In other words, the fact that references can be combined doesn't mean they should be combined.

For the above reasons, it is respectfully submitted that Fukunaga and Jun, whether taken alone or in combination, fails to disclose or suggest the present invention and favorable reconsideration is requested.

Paragraph 5 of the Official Action rejects claims 1, 5, 7, 9, 14, 18 and 20-29 as obvious based on the combination of U.S. Patent 6,081,305 to Sato et al. and Fukunaga. The Official Action asserts that Sato discloses the present invention except for teaching that the embedded conductive layer comprises a same organic resin as the resin of the interlayer insulating film. The Official Action then cites Fukunaga for teaching this feature. It is respectfully submitted that Sato does nothing to overcome the deficiencies noted above in connection with Jun and that this rejection is improper for the same reasons as noted above in connection with paragraph 4 of the Official Action. Favorable reconsideration is requested.

Paragraph 6 of the Official Action rejects claims 3, 6, 8, 10 and 20-26 as obvious based on the combination of U.S. Patent 5,990,542 to Yamazaki and Fukunaga. Paragraph 7 further rejects claim 15 based on the combination of Yamazaki and Fukunaga. The Official Action alleges that Yamazaki (Fig. 2B) discloses forming an embedded conductive layer made of ITO to cover the insulating layer and the opening wherein the embedded conductive layer contacts the active layer in the opening; and forming a transparent conductive layer 121 on the embedded conductive layer. The Official Action admits that Yamazaki does not disclose the embedded conductive layer made of carbon black and relies on Fukunaga for curing this deficiency of Yamazaki.

It is respectfully submitted this assertion is not reasonable. Yamazaki teaches that a contact hole is created, an ITO electrode for forming the pixel electrode is formed by means of sputtering and it is patterned to create the pixel electrode 121 (column 6, lines 7-9). The ITO electrode is formed in the contact hole and on the insulating film 120 by merely depositing an ITO film by sputtering. The Official Action fails to establish that there is a suggestion or motivation to modify the teachings of Yamazaki to utilize the material of Fukunaga in order to achieve the claimed invention. Rather, since the process of Yamazaki is entirely different from that of Fukunaga, Applicants believe that it would not have been obvious to make such a modification.

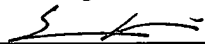
Paragraph 8 of the Official Action rejects claims 2 and 4 as obvious based on the combination of U.S. Patent 5,948,705 to Jun and U.S. Patent 6,221,140 to Kobayashi et al. Paragraph 9 further rejects claims 11-12 as being obvious based on the combination of Jun, Kobayashi, and Fukunaga.

The Official Action admits that Jun does not disclose that the conductive layer 46 is made of an oxide conductive layer and is formed by a spin coating method. The Official Action relies on Kobayashi for curing this deficiency. The Official Action is contending that it would have been obvious to form an oxide conductive layer by spin coating for the conductive layer 46 of Jun '705 in view of Kobayashi. However, although Kobayashi teaches to form an oxide conductive layer by spin coating, there is no suggestion in Kobayashi to form an oxide conductive layer as the plug 37 of Jun '705. The inventors of the present invention discovered that it is advantageous to form a layer for the plug by spin coating since the thickness of the layer should be equal to or larger

than the thickness of the underlying insulating film (see the first full paragraph of page 12). There is no suggestion or motivation to combine the teaching of Kobayashi with Jun '705 to achieve the claimed method and favorable reconsideration is requested.

Should the Examiner believe that anything further would be desirable to place this application in better condition for allowance, the Examiner is invited to contact Applicant's undersigned attorney at the telephone number listed below.

Respectfully submitted,

  
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